United Nations Industrial Development Organization

Distr.
LIMITED

ID/WG.233/21
31 January 1977

ENGLISH

Meeting of Selected Heads of Research Institutes
Vienna, Austria, 18 - 22 October 1976

REPORT ON THE MEETING OF SELECTED HEADS OF RESEARCH INSTITUTES

Prepared by the

International Centre for Industrial Studies

id.77-603

CONTENTS

Chapter		Page
I.	ELEMENTS OF CO-OPERATIVE ACTIVITIES	3
	Introduction	3
	Priorities for research and development	3
	Exchange of information	6
	Co-operative research activities	7
	Participation in the programme of work of UNIDO	9
	Follow-up	10
II.	CONCLUSIONS AND RECOMMENDATIONS	11

Annexes

I.	List of participants	14
II.	List of papers presented at the meeting	17

I. ELEMENTS OF CO-OPERATIVE ACTIVITIES

Introduction

With a view to promoting co-operation in research in the development of appropriate technology, a Meeting of Selected Heads of Industrial Research Institutes sponsored by UNIDO was held in Vienna from 18 to 22 October 1976. The participants included representatives of institutes in developing countries and of organizations in industrialized countries engaged in appropriate technology research.

The Meeting was directed by W.H. Tanaka, Acting Head of the Development and Transfer of Technology Section of the International Centre for Industrial Studies, UNIDO. E. Lartey, President of WAITRO and Director of the Industrial Research Institute of Ghana, was elected Chairman. The Rapporteurs were Malee Sundhagul, Director of the Technological Research Institute of the Applied Scientific Research Corporation of Thailand, and K. Venkataraman of UNIDO.

Annex I contains the list of participants, and annex II gives the titles of papers presented at the Meeting.

Priorities for research and development

The Meeting found the idea of evolving common priorities for research and development attractive, but thought that it raised certain questions. As a matter of over-all policy or strategy, the evolution of common priorities would be desirable; problems would arise, however, at the operational and project levels. Certain projects of high national priority might not necessarily be of common interest or priority to most developing countries. In addition, work done by way of contract research could not always be brought within a scheme of priorities.

The identification of common problems was more easily understood as a need, particularly for international organizations such as UNIDO in formulating their programmes realistically. UNIDO could bring together institutions interested in co-operative activities. There were several common problems for which UNIDO could promote and co-ordinate research and development efforts and, more importantly, bring them to international attention.

Thus, while the Meeting was unable to subscribe fully to the concept of evolving common priorities for research and development, it did produce a number of specific and concrete suggestions regarding the areas for priority action. Such priorities were identified as general and functional and as sectoral.

Emphasis was placed, as a matter of high over-all priority, on the need to strengthen the technological capabilities of the research institutes in the developing countries. Such capabilities would include the ability to develop indigenous technologies and to adapt existing technologies. Since successful transfer of technology depended largely on person to person contacts, the Meeting felt there was an urgent need to increase and upgrade, through training and other means, the capabilities of the technical and management personnel of research institutes in developing countries. In this context, research institutes in small countries faced special difficulties; because of their limited funds and capabilities, their efforts were spread thinly and ineffectively. They encountered difficulties in undertaking activities such as pilot plant construction or design of equipment to carry on a project on which they had done some initial work.

The problems of some of the small countries could not be completely solved even if their efforts were combined. The experience of the Central American Research Institute for Industry showed that when the resources of small countries were pooled, the activities of the Institute could not be fully supported locally and had to be supplemented substantially by international funds. (In this connexion, a question was raised whether UNIDO could establish a design team that would help in the design of small-scale equipment for projects on which initial work had been done by research institutes in East Africa.)

With respect to other general priority areas, attention was called to the need for financial support for research, commercialization of technology, and the promotion of industry-research relations. Emphasis was also placed on the availability of adequate technical services both for research institutes and for industries in the developing countries. Research institutes should take note of the need for problem-solving services.

With regard to sectoral priorities, the need to develop technology for the rural areas was stressed. In order to satisfy basic human needs, technologies to be developed and/or transferred should in the first instance relate to food, clothing and shelter, including the necessary supporting industries. Maximum use should be made of existing indigenous resources, whether human resources, raw materials, or common natural resources such as water, wind or solar energy. More specifically, reference was made to specific sectors such as post-harvest problems, agricultural machinery, multipurpose vehicles for rural areas, use of waste, use of fertilizers including slow-releasing fertilizers, agricultural by-products, renewable energy, scaling-down operations, and a number of others. The priority areas could be summarized broadly as:

(1) Food, shelter and clothing
(2) Resources for industry available locally
(3) Rural development
(4) Common marketing responsibilities
(5) Energy sources
(6) Creation of work opportunities
(7) Import substitution
(8) Common industries

It was emphasized that common areas should be identified in a systematic manner and preferably project by project. In view of the limited duration of the Meeting, it was proposed to draw up as a sample exercise, a matrix to show the interests of the participants in different industrial sectors. The matrix covered broadly the interests of the participants' institutes in the sectors of food and agriculture, engineering, energy, textiles, and general technologies. Considerable discussion took place on the utility of such a matrix; most participants viewed it with caution in that the matrix was based on a limited sample of institutes which it was felt were not necessarily representative of all the institutes in developing countries, and the classification of industry sectors adopted was also too general to provide specific information. While it did not reflect common problem areas accurately, the matrix did provide a ready source of information that would allow the participants to make personal contacts during the Meeting or later. It was felt that such a matrix, with further elaboration, might also provide a useful methodology for the collection of information and for the identification of common areas of concern. It was suggested that UNIDO should attempt to develop the matrix further and update it periodically to provide a systematic account of the activities of interest to the various types of institutes.

The matrix could show through appropriate symbols (such as plus and minus) the institutes that have the capability of assisting other institutes in a particular area, and those that need assistance in a particular area. However, the exercise attempted at the Meeting was tentative only, and specific indications of capabilities or assistance were premature.

Exchange of information

The Meeting stressed that information on the activities that had been or were currently being undertaken by various research institutes needed to be generally made known if co-operative activity was to be accelerated. It was pointed out that the organization of the Meeting itself and the papers presented to it brought out a good deal of information which had not previously been known. It would make a valuable innovation if UNIDO were to act as a focal point for the exchange of information among industrial research institutes. The organization could develop, in the form of a matrix or through other means, a systematic and comprehensive inventory of research activities completed, in progress, or being planned in developing countries. This would eliminate a lot of duplication in work, promote co-operation, and help to identify gaps in research.

As regards information exchange in general, different types of activities could be envisaged:

(a) There was a need for studies of past and present experience in appropriate technology. Appropriate Technology, the journal published by the Intermediate Technology Development Group of London, performed such a function in respect of experience in field work;

(b) Information was needed on which institute was investigating which problem and where. It would be expensive and time-consuming for all concerned if every institute were to try to find this out by addressing questionnaires to others. In this respect, an organization such as UNIDO could collect and disseminate such information systematically;

(c) Information was also needed about existing technological options. Here again, an international organization such as UNIDO should be able to provide the information on a systematic basis.

In subsequent discussion it was considered that one of the major contributions that the Meeting could make would be to emphasize the role of UNIDO in information exchange. It was also pointed out that there was a need for packaging the information in an appropriate way, for providing information on technical as well as related economic data for advisory services, and for promoting personal contacts as much as possible. There was also a need for all research institutes to prepare comprehensive annual reports, possibly in a comparable form, and to exchange them systematically. The information activities and publications should also be designed for decision makers.

It was suggested that UNIDO should publish periodically an information letter on the appropriate technology activities going on in the world. It was also suggested that UNIDO should publish a guide to information sources on appropriate technology.

On the general question of information exchange, certain broad guidelines could also be given, such as:

(a) If "hard" technical information were available in a comprehensive form, it could be published;

(b) If such information were not available in published form, but was known by someone, it would be important to know who had the information and to be able to refer to him when necessary;

(c) It would be necessary to know which institutes or individuals were working on which problems.

As regards the exchange of information, emphasis was also placed on having appropriate national input centres which could provide information. Reference was made to documentary systems like the Current Agricultural Research Information System (CARIS) of FAO.

Co-operative research activities

The Meeting strongly emphasized the need for encouraging co-operative activities among industrial research institutes. This would be particularly useful for the institutes of small countries which lack the resources and the capability of following up the results of their own laboratory tests. The benefits of co-operation would not be confined to small research institutes alone, however. By and large, research institutes in developing countries lack the critical mass of effort necessary to solve a research problem. Co-operative research would not only help in avoiding duplication of effort, but would make possible the complementarity of services, a concentrated attack on common specific problems, a comparison of results and the testing of equipment and prototypes in different situations. It was felt that encouragement of co-operative research activities would be one of the important ways through which the existing deficiency in the development of appropriate industrial technology in developing countries could be rectified.

From the discussion and the papers presented by the participants, it emerged that several cases of co-operative research activities already existed. Some represented co-operation between an institute in a developing country and one in a developed country. A few cases existed in which an institute in one developing country had tried to help another in a less developed country. One feature noted in

many co-operative arrangements was that they resulted from the search of an institute in a developed country for a suitable partner in a developing country; it would have been more appropriate if institutes in developing countries had identified counterparts more systematically for co-operative research. The experience with the existing co-operative arrangements clearly demonstrated the usefulness of such arrangements, but also brought out some of the limitations.

Lack of finance was identified as a major problem inhibiting co-operative research, involving as it did additional costs such as the travel expenses of the collaborating institutes' personnel. These costs, in certain cases, had to be paid in foreign exchange and were thus difficult for developing countries to afford. What was needed in such cases was supplementary sources of funds. In other instances, resources might be needed on a much larger scale. It was generally considered that UNIDO might interest potential funding organizations or agencies in stimulating co-operative research. Some projects might not need large amounts, and some type of block funding whereby a number of small projects could be taken up without being individually approved would be useful.

It was pointed out that a considerable amount of administrative work, which often took up the time of directors of research institutes, was involved in co-operative arrangements. It was felt that much of this might be avoided if there were greater appreciation on the part of administrators and policy-makers of such arrangements. It was felt that organizations such as UNIDO should try to find ways and means of involving the policy makers in these arrangements. It was suggested that it might be helpful, in the event of an agreement being signed between two countries on scientific and industrial research co-operation, if the areas of activities could be specified in a general way rather than in specific projects. After broad agreement had been reached, specific projects could be worked out at the level of the research institute. It was emphasized that co-operative activities were possible not only in the area of actual research, but also in a number of other matters, including co-operation in the commercialization of a process already developed, training of technical and managerial personnel, and the exchange of experiences in such administrative and organizational matters as incentive systems for research workers.

Before looking for co-operative arrangements outside the country, national research institutes should look for them within the country and make use of existing local expertise. Existing institutes should be strengthened wherever possible instead of new ones being created. In this context, new appropriate technology centres might not always be needed; rather, existing research institutes should be oriented to the problems of appropriate technology.

In stimulating co-operative research activities, it was felt that UNIDO could bring together the potential supply and demand. It was also suggested that a concrete way in which UNIDO could promote co-operative activities would be to undertake specific pilot projects involving co-operative research, and to demonstrate through them the usefulness of such activities. Such activities could be undertaken in the following areas:

Low-cost technology for rural development (with or without electricity)

Technology for protein enrichment of starchy foods

Small-scale processing equipment

More information was needed on organizations which could stimulate or fund co-operative research activities or provide training services that could be shared by different institutes. Several participants gave relevant information on their institutes. They also expressed their willingness to collaborate with other research institutes under UNIDO auspices, in the commercialization of the results of research and in other types of activities.

The Meeting also noted with interest the programme of co-operation among developing countries which was administered by UNIDO. Such a programme made it possible in certain cases to cover the costs of travel in organizing co-operative research activities. UNIDO should endeavour to mobilize further financial and institutional support for co-operative activities.

Participation in the programme of work of UNIDO

The Meeting noted that, in addition to its technical assistance activities, UNIDO was taking steps to carry out several programmes in appropriate industrial technology, including:

(a) Programmes of research and development for:

A prototype small-scale, low-cost stabilizer for rice bran

Developing methods of treating cotton textile materials for specific end-uses in developing countries;

(b) Programmes for identification and assessment of indigenous technologies in food processing and preserving, and in building materials;

(c) A programme of sponsored research at the graduate level in universities.

Several participants expressed interest in participating in these programmes and explained their own activities in this context. In general, it was found that the programmes of UNIDO would lend themselves to possible co-operative activities. The participants felt that UNIDO had an important role to play in stimulating co-operative activities among research institutes.

Follow-up

It was recognized that if concrete and practical results were to result from meetings of this type, follow-up was essential. As one method of follow-up, it was recommended that such meetings should be organized on an annual or even six-monthly basis.

It was suggested that UNIDO establish panels of specialists drawn from research institutes according to industry sectors, and arrange periodic meetings in order to promote co-operative research and the exchange of experience.

It was also suggested that UNIDO continue to maintain its contacts with research institutes and to seek the assistance and support of bilateral or multilateral donors for financing co-operative research activities. One concrete way of follow-up would be to start specific projects to demonstrate the usefulness of co-operation. It was also proposed that UNIDO should develop an information exchange network. It was thought necessary that the participants pass on to other institutes within and outside their countries, through their journals and by other means, the results of the present Meeting and information on the possibilities of co-operative research.

It was suggested that co-operative activities that could be stimulated by UNIDO among research institutes, would consist of, among others:

Studies for identifying projects for co-operative research
Joint projects
Exchange of information and current knowledge about new developments in technology
Assistance in the form of experts and training

At the conclusion of the Meeting, several participants announced that they had sounded out other participants on matters of common interest. These contacts would be further developed after the Meeting. The participants were requested to keep UNIDO informed of the type of co-operative activities they were engaged in, and UNIDO on its part would be willing to provide any possible assistance in stimulating co-operative activities.

II. CONCLUSIONS AND RECOMMENDATIONS

Priority needs

1. For the development and transfer of technology to be effective and successful, high priority should be given to strengthening the technological capabilities of the research institutes in the developing countries. Such capabilities would include the ability to develop indigenous technologies and to adapt existing technologies. As successful transfer of technology depends largely on personal contacts, there is an urgent need to increase and upgrade, through training and other means, the capabilities of the technical and management personnel of research institutions in developing countries.

2. In order to satisfy basic human needs, technologies to be developed and/or transferred should in the first instance relate to food, clothing and shelter, including necessary supporting industries. Maximum use should be made of existing indigenous resources, whether human, raw materials, or common natural resources such as water, wind or solar energy.

3. It would be desirable to evolve some common priorities in selecting research projects. Such projects should be practical and problem oriented. At the same time, it is recognized that projects of high national interest and priority may not necessarily be those of common priority to most developing countries, though they might lend themselves to bilateral or multilateral co-operation on a case-by-case basis. In addition, work done by contract research may not always fit into a scheme of priorities. While it is possible to identify priority areas in broad guidelines or as a general strategy, the adoption of such priorities for operational project-to-project purposes is not easy. It is nevertheless desirable to identify certain areas of common interest so that agencies such as UNIDO can bring together interested institutes for co-operative activities in these areas.

Exchange of information

4. Lack of information on the activities being undertaken by various research institutes is a hindrance which needs to be rectified if co-operative activity is to be accelerated. It is suggested in this respect that UNIDO act as a focal point for the exchange of information among such institutes. In each country, a national research institute should be identified to function as the national contact point for this purpose.

5. It is suggested that UNIDO should take steps to disseminate, periodically, information on the appropriate technology available from or required by research institutes. It is also suggested that UNIDO publish a guide to information sources on appropriate technology.

Co-operative research activities

6. Co-operative activities among research institutes suffer from limitation of funds and complicated and time-consuming administrative procedures. It is necessary to bring to the notice of potential funding organizations and agencies, through UNIDO and by other means, the funding problems involved. Ways of enlisting the policy-makers' involvement must be found to minimize complicated administrative procedures. One helpful procedure would be to get the policy-maker's approval for areas of activity in which specific projects could be worked out at the level of the research institutes.

7. National research institutes should make maximum use of existing local expertise before looking for outside assistance. Existing institutes should be strengthened, wherever possible, instead of new ones being created.

Role of UNIDO

8. UNIDO has an important role to play in stimulating co-operative activities among research institutes and organizations in developing and developed countries, through organizing and co-ordinating a network of such institutes concerned with the development and transfer of appropriate industrial technologies. For this purpose it is suggested that UNIDO should:

(a) Organize a system of information exchange;

(b) Identify common areas and projects for co-operative effort;

(c) Identify research institutes that would require or could offer assistance;

(d) Establish panels of technical experts in identified common areas and bring them together to help solve specific problems in such areas;

(e) Facilitate the financing of co-operative activities as part of its activities in promoting co-operation among developing countries (for example the programme for technical co-operation among developing countries) or meet the costs of co-operative research activities, in particular their foreign exchange costs;

(f) Approach potential funding sources having an interest in appropriate technology with a view to securing financial support for specific projects;

(g) Promote co-operative activities for the development of research management;

(h) Promote co-operative activities in the training of managerial and technical personnel;

(i) Promote the exchange of experience among research personnel regarding problems of commercialization, incentive systems for research, etc.;

(j) Initiate within the shortest possible time pilot projects of co-operative research activities in order to demonstrate the usefulness of such activities and to develop a methodology for co-operative effort.

9. Information on training services available at institutes, such as the Netherlands Universities' Foundation for International Co-operation (NUFIC) and the Engineering and Industrial Design Development Centre (EIDDC) of Egypt, and on the possibilities of financing training programmes (e.g. as part of the Technische Ontwikkelings Ontwikkelingslanden (TOOL) aid scheme) need to be systematically collected and made known.

10. Several participants, in particular the representative of the Korea Institute of Science and Technology (KIST), expressed their willingness to collaborate with other research institutes in the commercialization of research results. Such collaboration should be encouraged and aided through the UNIDO programme of co-operation.

11. The programmes of UNIDO in the field of appropriate technology were found to be of interest to several participants and should offer the possibility of co-operation.

Follow-up

12. Meetings such as the present one should be organized by UNIDO on an annual or even six-monthly basis. The meetings could take two forms: one would be designed for heads of research institutions to explore possibilities of co-operation among themselves and to review the status of co-operative projects already established. The other would allow technologists at the working level to confer on specific problems. Meetings of the latter type could best be conducted at research institutes in countries where related work was actually going on.

13. As a follow-up to the Meeting, UNIDO should continue to develop its information exchange network and possibly extend its coverage.

14. Participants should pass on information, through their journals and by other means, the results of the Meeting and the possibilities of co-operative research to other institutes within and outside of their countries.

15. As a concrete follow-up measure, practical projects of co-operation should be initiated as a matter of urgency.

Annex I

LIST OF PARTICIPANTS

Isaac A. Akinrele, Director of Research
Federal Institute of Industrial
Research, Oshodi
PMB 1023, Ikeja
Lagos, Nigeria

Peter R. Attwood, Technical Co-ordinator
Department of Industrial Engineering
Eindhoven University of Technology
P.O. Box 513
Eindhoven, Netherlands

Hollis Charles, Director
Caribbean Industrial Research Institute
Tunapuna Post Office, Trinidad and Tobago

Gabriel Dengo, Director
Central American Research Institute
for Industry
P.O. Box 1552
Guatemala City, Guatemala

Jacques Diouf, Executive Secretary
West African Rice Development Association
(WARDA)
P.O. Box 1019
Monrovia, Liberia

Rafael Garcia de Quevedo, General Director
Centro de Estudios Económicos y Sociales
del Tercer Mundo
Porfirio Diaz 50, San Gerónimo
Lidice - Mexico 20 D.F., Mexico

Sang Joon Hahn, President
Korea Institute of Science and
Technology (KIST)
P.O. Box 131, Cheong Ryang
Seoul, Korea

Ross William Hammond, Director
Economic Development Laboratory
Georgia Institute of Technology
Atlanta, Georgia 30332, USA

Emmanuel Lartey, Director
Industrial Research Institute
P.O. Box M 32
Accra, Ghana

Thomas Anthony Lawand, Director
Brace Research Institute
McGill University, Ste. Anne de Bellevue
Quebec, Canada

Josef Lukacs, President
Research Institute of the Electrical
Industry
XV Cservenka Ut. 86
Budapest, Hungary

Yusef Khalil Mazher, Director General
Engineering and Industrial Design
Development Centre
Ministry of Industry
P.O. Box 2267
Cairo, Egypt

Krongthong Niamthan, Head
Information Service Division
Applied Scientific Research Corporation
of Thailand
196 Phahonyothin Road, Bangkhen
Bangkok, Thailand

Han W. Pack, Director
Technology Transfer Center, KIST
Seoul, Korea

Goetz F. Pflieger, Project Leader
c/o Institut für Produktionstechnik und
Automatisierung an der Universität Stuttgart
Postfach 951
Stuttgart 1, Federal Republic of Germany

José Alcides Rodriguez, President
Instituto Nacional de Tecnología Industrial
Libertad 1235
Buenos Aires, Argentina

George F. McRobie, Director of Development
Intermediate Technology Development Group Ltd
Parnell House, 25 Wilton Road
London SW1V 1JS, UK

Jürgen Schmid, Project Leader
c/o Institut für Produktionstechnik und
Automatisierung an der Universität Stuttgart
Postfach 951
Stuttgart 1, Federal Republic of Germany

Joao Bosco de Siqueira, Director General
Instituto Nacional de Tecnología
Av. Venezuela 82
Rio de Janeiro, Brazil

Roberto Soto Maynez, Auxiliar del Director General
Centro de Estudios Económicos y Sociales
del Tercer Mundo
Porfirio Diaz 50, San Gerónimo
Lidice - Mexico 20 D.F., Mexico

Malee Sundhagul, Research Director
Technological Research Institute
Applied Scientific Research Corporation
of Thailand
196 Phahonyothin Road, Bangkhen
Bangkok, Thailand

Cuthbert Looken Tarimu, Director
East African Industrial Research Organization
P.O. Box 30650
Nairobi, Kenya

Hans-Jürgen Warnecke, Full Professor and Director
Institut für Produktionstechnik und
Automatisierung an der Universität Stuttgart
Postfach 951
Stuttgart 1, Federal Republic of Germany

Annex II

LIST OF PAPERS PRESENTED AT THE MEETING

ID/WG.233/1	"Description of the activity of the research institute of the electrical industry (VKI-Hungary) in solving problems and transfer of technology" by J.L. Lukács, Managing Director, VKI, Hungary
ID/WG.233/2	"Transfer and development of technology" by E. Lartey, Director, Industrial Research Insitute, Ghana
ID/WG.233/3	"Report on the activities of the Brace Research Institute and their relation to development and technology transfer" by T.A. Lawand, Director, Field Operations, Brace Research Institute, Macdonald College of McGill University, Quebec, Canada
ID/WG.233/4	"The Central American Research Institute for Industry (ICAITI): Development and transfer of technology" by Gabriel Dengo and Salvador Samayoa, Director and Assistant to the Director, Central American Research Institute for Industry, Guatemala
ID/WG.233/5	Provisional Annotated Agenda
ID/WG.233/6	Provisional list of participants
ID/WG.233/7	"Argentine Republic, technical assistance to underdeveloped countries: a way of action" by José Alcides Rodriguez, President, Instituto Nacional de Tecnología Industrial (INTI), Buenos Aires, Argentina
ID/WG.233/8	"The Applied Scientific Research Corporation of Thailand and its role in research and development" by Malee Sundhagul, Research Director, Technological Research Department, Applied Scientific Research Corporation of Thailand, Bangkok, Thailand
ID/WG.233/9	"Programmes of the West Africa Rice Development Association" by Jacques Diouf, Executive Secretary, West Africa Rice Development Association, Monrovia, Liberia
ID/WG.233/10	"An experience in the development and transfer of technology" by Yusef K. Mazhar, Director General, Engineering and Industrial Design Development Centre, Dar Es Salam, Cairo, Egypt
ID/WG.233/11	"Activities of the Central Food Technological Research Institute, Mysore, India" by B.D. Amla, Director, Central Food Technological Research Institute, Mysore, India

ID/WG.233/12 "Technology - the critical choice for developing countries: the work of the Intermediate Technology Development Group"
by G. McRobie, Director, Intermediate Technology Development Group Ltd, London, UK

ID/WG.233/13 "Information paper on the appropriate Technology Group at the Eindhoven University of Technology"
by P.R. Attwood and B. van Bronckhorst
Department of Industrial Engineering, Eindhoven University of Technology, the Netherlands

ID/WG.233/14 "Appropriate technology research at the Georgia Institute of Technology and the Small Industry Development Network"
by Ross W. Hammond, Director, Economic Development Laboratory, Georgia Institute of Technology, Atlanta, Georgia, USA

ID/WG.233/15 "Note on the Federal Institute of Industrial Research, OSHODI"
by Dr. I.A. Akinrele, Director of Research, Federal Institute of Industrial Research, Oshodi, Lagos, Nigeria

ID/WG.233/16 "Appropriate technology development: the CARIRI experience"
by Hollis Charles, Director, Caribbean Industrial Research Institute, Tunapuna, Trinidad

ID/WG.233/17 "Purposes, objectives and focal points of the Institute for Production Engineering and Automation (IPA)"
by H.J. Warnecke, Full Professor at the University of Stuttgart and Director of the IPA, Stuttgart, Federal Republic of Germany

ID/WG.233/18 "Korea Institute of Science and Technology: contribution to Korea's industrial development"
by Hahn Sang Joon, President, Korea Institute of Science and Technology, Seoul, Korea

ID/WG.233/19 "The East African Industrial Research Organization: an international co-operative research institute"
by C.L. Tarimu, Director, East African Industrial Research Organization, Nairobi, Kenya

ID/WG.233/20 The role of the National Institute for Technology (INT) and of the Technology Support Fund (FUNAT) in the Brasilian policy for industrial technology"
by J.B. de Siqueira, Director General, INT/FUNAT, Brazil